Soil and Nutrient Network

Helping farmers improve soil and nutrient management

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Case study -

Waternish Farm, Isle of Skye

Waternish Farm, Isle of Skye, takes managing farm wildlife and biodiversity very seriously. It is certainly understood by the Montgomery family whose "Farm Tours" diversification business relies on opportunities to see not just their Aberdeen Angus herd but also a variety of bird species drawn to the area, in part by the insect life and seeds in a biodiverse habitat based on sound soil.

The farm has a small herd of Aberdeen Angus cattle whose calves are sold at the Portree Mart each September. The silage in the farm is all cut in September to benefit corncrakes. In addition other fields are managed to benefit wading birds. The farm website has list of species recorded on the farm in relation to 23 are red listed species and 41 amber listed. They also do a farm tour walk and talk or an Afternoon Tea (www.waternishfarm.com).

Compaction

At the first meeting there was discussion about compaction in two areas.

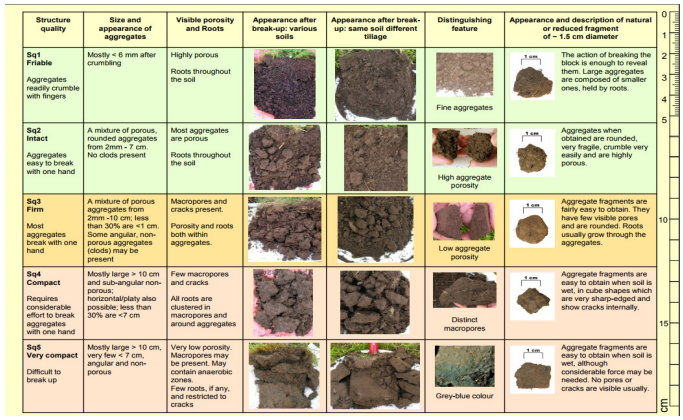
1. Damp area near where bales are stored
2. Wheelings from late cut silage

Although the compaction was not as bad as the host farmer feared it was decided at the second meeting that two types of tools would be be tested.

In addition Gavin Elrick would draw up a drainage plan to reduce the wet area and prevent future compaction in that area.

Healthy soils are key to maximising productivity. Identifying and remediating problem areas in your soil is key to improving soil health. Removing compacted layers will help root development and help crop growth. Careful management of grass ley soils can help increase the length of time between reseeds.

You can assess your soil structure by digging a hole and using the Visual Examination of Soil Structure (VESS) chart to help identify they type of soil structure in your field. It is important to check several areas within a field, in particular areas that can be seen to have problems, e.g. tracking, puddling, at gateways etc.



Structure quality	Size and appearance of aggregates	Visible porosity and Roots	Appearance after break-up: various soils	Appearance after break-up: same soil different tillage	Distinguishing feature	Appearance and description of natural or reduced fragment of ~ 1.5 cm diameter
Sq1 Friable Aggregates readily crumble with fingers	Mostly < 6 mm after crumbling	Highly porous Roots throughout the soil			Fine aggregates	The action of breaking the block is enough to reveal them. Large aggregates are composed of smaller ones, held by roots.
Sq2 Intact Aggregates easy to break with one hand	A mixture of porous, rounded aggregates from 2mm - 7 cm. No clods present	Most aggregates are porous Roots throughout the soil			High aggregate porosity	Aggregates when obtained are rounded, very fragile, crumble very easily and are highly porous.
Sq3 Firm Most aggregates break with one hand	A mixture of porous aggregates from 2mm -10 cm; less than 30% are <1 cm. Some angular, non-porous aggregates (clods) may be present	Macropores and cracks present. Porosity and roots both within aggregates.			Low aggregate porosity	Aggregate fragments are fairly easy to obtain. They have few visible pores and are rounded. Roots usually grow through the aggregates.
Sq4 Compact Requires considerable effort to break aggregates with one hand	Mostly large > 10 cm and sub-angular non-porous; horizontal/platy also possible; less than 30% are <7 cm	Few macropores and cracks All roots are clustered in macropores and around aggregates			Distinct macropores	Aggregate fragments are easy to obtain when soil is wet, in cube shapes which are very sharp-edged and show cracks internally.
Sq5 Very compact Difficult to break up	Mostly large > 10 cm, very few < 7 cm, angular and non-porous	Very low porosity. Macropores may be present. May contain anaerobic zones. Few roots, if any, and restricted to cracks			Grey-blue colour	Aggregate fragments are easy to obtain when soil is wet, although considerable force may be needed. No pores or cracks are visible usually.

Visual Evaluation of Soil Structure Score Sheet

Scottish Government
Riaghaltas na h-Alba
gov.scot
Farming & Water Scotland
Farming for a Better Climate
SAC Consulting
The European Agricultural Fund for Rural Development
Europe investing in rural areas

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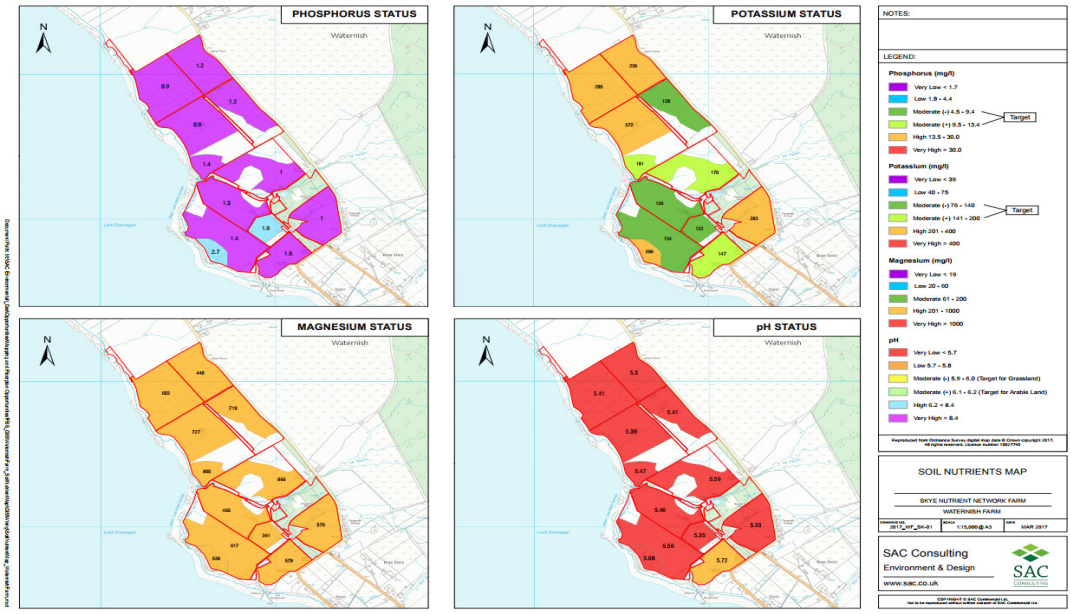
Nutrient Status

During the first meeting of the Skye Nutrient Network local crofters and farmers learned the significance of what lies beneath the surface of their soils. The health of bacteria, worms and creepy crawlies is as important as the levels of nutrients like nitrogen and phosphate.

The whole farm was soil sampled and the maps below show the analysis for each field



Waternish Farm soil nutrient maps showing Phosphorus, potassium, magnesium & pH sa-

The fields all have too low pH both for optimum grass and clover yields but more importantly perhaps for invertebrates that are key food for corncrake chick and wading birds.

“The key message is that what is going on below the soil, both chemically and physically, is not just important for grass growth, but for the birds that depend on invertebrates, like young corncrakes and waders.”

“The soil at Waternish Farm has a great depth with roots growing to 500mm in some of the places we tested. However the soil pH or its acidity is low, as are the levels of phosphorous, both of which will have implications both for grass and clover growth as well as worm numbers and other insects and grubs important for wildlife. Applications of lime and other fertilisers will not just benefit crop yields but also biodiversity.”

“The weekend weather offered a great start for our Skye Nutrient Network” commented Janette Sutherland. “Further free meetings will look at soil management options that can that produce both agricultural and wildlife benefits.”.

Key Findings

- Cutting silage late to benefit corncrakes can cause compaction issues—future meetings will look at kit which can alleviate this issue
- The low pH of the fields needs to be addressed to benefit both grass and the habitat for wading birds
- The soil testing has shown that a change of fertiliser for the silage to DAP 18:46:0 will target the low P status and we can have a potash holiday
- Soil is a complex living community
- Manging the nutrients on a farm or croft is important for biodiversity.
- There is a tree species for most situations— select for your individual farm or croft.
- Crofters should ensure they access CAGS to undertake drainage and reseeding works

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On the Silver Screen

Waternish Farm provides excellent habitat for Corncrakes and Wading birds. We decided to capture this through videos. So the first video focused on Liming and biodiversity with the RSPB to benefit habitats for both wading birds and improve grass yield. For a bit more detail about soil testing and liming you can watch Soil Liming:why its important

During the Montgomery's management Waternish Farm has been transformed to be a haven for Corncrake. Waternish Farm is a member of the Skye Crofting and Corncrake Partnership (SCCP).

- Active Crofting and Corncrakes
- Developing Corncrake Habitats on Skye

Managing Farms for biodiversity can result in you doing this you never expected. This video captures Robert's response to growing nettles for corncrakes. You can watch the videos on our YouTube Channel at https://goo.gl/Yy4ugX

Gavin Elrick's Drainage Tips from the 2nd Meeting

- Clear ditch's of excess vegetation and silt
- Clear pipe drain outfalls and culvert
- Trim back trees near ditch's
- Where a pipe passes near to trees or hedges make sure the pipe is sealed for 5 m either side
- When installing pipes make sure pipe is deep enough to pick up any identified spring water
- Where passing through areas of impermeable soil use gravel back fill (20-40 mm diameter washed gravel or clean stone)
- Use good quality pipes and connectors as the drains will be installed for a long time 30 to 60 years life span.
- Where the pipe discharges to the ditch use a purpose built headwall or build using local stone to keep the outlet firm and identifiable
- At culvert outlets put large stones in the base of the ditch to prevent erosion.
- When planning for drainage allow enough capacity in the pipe sizes to allow future expansion for all areas the pipe may drain when the budget is available.

Alleviating Compaction - Second group meeting

During the second meeting attendees got to examine the effect from using two types of aeration kit. We demonstrated the use of a Grass slitter for alleviating compaction from 25mm to 150mm deep on grassland

Sub-soiler for alleviating compaction from 300mm to 500mm deep on grass land or arable ground.

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Final event - roundup of the project

As we reflect on the Farm Nutrient Management Farm project, at Waternish Farm one of the key themes has been finding win-win solutions in this High Nature Value (HNV) farm. This has been the case when we have considered soil pH to benefit both grass growth and farmland waders. We have also surveyed the existing farm woodlands, a mixture of policy woodlands and riparian areas. The riparian areas especially provide both benefits to water quality as well as a new habitat for many pollinators and farmland birds.

Of course there can be conflict between managing silage due to the late cutting dates (in order to benefit the corncrakes) and not creating soil compaction. We have looked at drainage and aeration equipment that can help mitigate this. Soil is the foundation for so much of the biodiversity that we appreciate and this project has considered biodiversity from the humble fungi & worms in the soil, up to the red listed birds which include Corncrakes, Curlew and the apex predator the White tailed Eagle which often soared over meetings and demonstrations.

To celebrate the end of this project our final meeting consisted of viewing some of the videos that had been made about the biodiversity management on the farm. We had a fun stock judging completion which Included a class on tree species sensitivity to pH. We would like to Thank Dingwall and Highland Marts for providing the Portree Mart as a venue. We would also like to thank MacLaren tractors Dingwall for the demonstration of equipment.

Stock-judging with a twist….

We ran a small stock-judging competition at our final event …. With a twist. Instead of judging livestock, we tested how well our attendees had paid attention to our forestry topic during a previous meeting. We asked everyone to put samples of trees in order from those most suited to acidic soil conditions to the least suited. We had a prize giving award ceremony too!

Austin Little (pictured right) won the competition with runner up Farqhuar MacRae (pictured left). They won free soil analysis to put some of the findings from the project to work on their own crofts.

For more information on the Soil and Nutrient Network see www.farmingandwaterscotland.org, For dates of SNN events, find us on Facebook or follow us on Twitter @FarmWaterScot.